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# Investigating the Knowledge and Awareness of Appendectomy and Its Complications Among Population of Makkah

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**Abstract** **Background:** Acute appendicitis is considered one of the most common causes of abdominal pain that affects both adults and children. Typically requires emergency surgical intervention to prevent complications such as perforation and peritonitis. **Objectives:** This study aimed to fill the research gap by assessing the level of awareness and knowledge of appendectomy by identifying knowledge gaps that may impact health outcomes and complications among adults in Makkah City, Saudi Arabia. **Methods:** This is a cross-sectional study involving a random sample of 286 participants. Conducted from January to June 2025 in Makkah, Saudi Arabia. Using an online self-administered questionnaire assessing the demographics, personal medical history, awareness of appendicitis symptoms, understanding of surgical options and knowledge of postoperative complications. Data were analyzed using SPSS version 29, with chi-square and Fisher's exact tests. **Results:** About half of the participants (51.7%) have good overall knowledge, while 48.3% of the participants have poor knowledge. Females have significantly higher knowledge compared to males (55.1%) to 36% in males. The most common identifiable symptom was abdominal pain (93.7%), followed by nausea (65.7%) and vomiting (62.2%). About half (57.0%) of the participants recognized both surgical interventions for appendectomy, 22.0% only knew about laparoscopic surgery and 21% knew only the open surgery. **Conclusion:** Despite the good knowledge among the participants, there is still a substantial proportion who had a poor understanding, particularly among males and married individuals. These findings emphasize the need for a health education program to improve public awareness of acute appendicitis, its management and potential surgical outcomes.

**Key Words** Appendicitis, Appendectomy, Public Awareness, Surgical Complications, Cross-Sectional Study

## INTRODUCTION

One of the most frequent procedures is appendectomy. The most often occurring cause of appendectomy is acute appendicitis. Nine to ten percent of individuals at some point in their life suffer from acute appendicitis [1]. Acute appendicitis most usually strikes between the ages of 10 and 20 [2]. For more than a century, appendicitis has been treated using the conventional approach known as appendicectomy. In roughly 300,000 appendectomies carried out annually in the United States, surgeons remove the appendix. More than a century ago, an open appendectomy was the only widely used treatment for appendicitis. With a lifetime risk of 8.6% for men and 6.9% for women, acute appendicitis is the most common gastrointestinal surgical emergency seen worldwide [3]. Although it can be discussed whether to operate or not on these patients, its current mainstay therapy is appendectomy and it is the most performed procedure within an acute care surgery service. While the post-appendectomy mortality rate has reduced significantly in recent times, the morbidity rate remains high. Based on pre-operative, intra-operative and histopathological features, patients with acute appendicitis are categorized as either uncomplicated or complicated. Uncomplicated appendicitis refers to an appendiceal inflammation without gangrene, perforation or intraperitoneal purulent fluid. As a counterpart, complicated appendicitis applies to all cases with either a gangrenous inflamed appendix with or without perforation, intraabdominal abscess, peri-appendicular contained phlegmon or purulent free fluid [4]. Numerous other studies have established it. In patients with

appendicitis, presence or rather the status of being complicated, is a significant risk factor that influences the outcome of patients after appendectomy. The common complications were infectious ones. A higher ASA grade was associated with infectious complications. In some cases of complex appendicitis where bacterial culture was positive, patients might be at a higher risk for infectious complications. High-risk patients need frequent follow-up to find any early infection symptoms and start treatment right away. Enough perioperative care must be immediately implemented to prevent complications resulting from possible comorbidities. The 10% morbidity rate and 0.24%-4% death rate of acute appendicitis reflect their nature. It is the most frequently diagnosed disease among emergency surgeons and it accounts for about 20% of all surgical interventions [6]. There are many clinical researches that can illustrate the best practice in managing acute appendicitis [7]. An appendectomy is an easy, simple and standard procedure. Despite this, there are some risks of the procedure, like infection, bleeding, injury to the nearby organs and blocked bowels. It's extremely important to know that the complications of an appendectomy procedure are far less serious than the risks of appendicitis if left untreated and it can be dangerous. Appendicectomy should be done as early as it is possible to prevent abscesses and the development of peritonitis [8,9]. Acute appendicitis is not easy to diagnose in some patients with atypical presentation and additional imaging is required for an early diagnosis. Laparoscopy allows the doctor to obtain superior visualization of the peritoneal cavity and exclusion of other pathology when the diagnosis of appendicitis is equivocal; thus, it is often the operation of choice in women that are of childbearing age in whom the differential diagnosis for appendicitis is broad [10]. Laparoscopic appendicectomy is a low-morbidity surgery that is safe. It is advantageous in obese patients, patients with other pathology and patients with an unusual position of the appendix and it has a low infection rate [11]. Research showed that the reason for investigating the function of laparoscopy in the diagnosis and management of acute appendicitis validates these findings [12,13].

Azodi *et al.* [14], in a 2008 Swedish study, assessed for complications following open appendectomies in patients with increased BMIs and a history of smoking. Smokers and obese patients had higher rates of complications (7.3% and 9.8%, respectively) compared to nonsmokers and normal-weight patients (3.8% and 3.6%, respectively) [13]. Previous literature established a link between epidemiological factors, pre-surgical variables and surgical variables on appendectomy outcomes. However, earlier studies considered a limited number of complications and involved limited variables and most studies in Saudi Arabia had relatively small sample sizes [14]. one of the biggest retrospective analyses of appendectomy procedures in Saudi Arabia that we are aware of. The research was conducted in a tertiary care center and this could have made the complications seem lower than in primary centers. We recommend a multi-center study be conducted to establish more accurate results [14]. To our knowledge, there is no previous study conducted in Saudi Arabia, particularly in the Makkah region and therefore this is the first study that aimed to investigate the knowledge and awareness of appendectomy and its complications among the population of Makkah.

The primary objective of this study is to evaluate public knowledge regarding appendicitis and the necessity of surgical intervention. In addition, the study aims to identify existing gaps in knowledge that may influence public perceptions of appendectomy and surgical decision-making. It also seeks to assess the level of public understanding about potential post-surgical complications, both short-term and long-term. Moreover, the study intends to provide valuable insights for healthcare professionals on how public education about appendectomy can be improved.

## METHODS

### Study Design

This cross-sectional observational study assessed the awareness of appendectomy and its complications in Saudi Arabia, focusing on the associations between demographic factors, knowledge levels and sources of information. Data were collected through an online questionnaire, documenting participants' demographics, understanding of appendectomy indications, awareness of potential complications and familiarity with post-surgical care. The study was conducted over a period of six months, from January to June 2025, which included data collection, analysis and manuscript writing.

### Study Population

The target population was Saudi adults, representing individuals from various demographic backgrounds across Saudi Arabia. These were individuals who may or may not have had prior knowledge of appendectomy and its complications in Saudi Arabia.

### Inclusion Criteria

Saudi adults (aged 18 years and older), able to provide informed consent, both genders, participants who could read and understand Arabic and individuals with or without a history of appendectomy.

### Exclusion Criteria

Non-Saudi individuals, individuals under 18 years old, Individuals with language barriers preventing them from understanding the survey and individuals with severe cognitive impairments that hindered their ability to provide meaningful responses.

### Study procedures

The data were collected via electronic questionnaires, with participants recruited through online platforms, to ensure a diverse sample representing various demographics.

Data collection included demographic information (age, gender, education level and region of residence), knowledge and awareness of appendectomy (indications, procedure,

complications and post-surgical care), sources of information (healthcare professionals, social media, family or personal experience) and personal medical history related to appendicitis or previous surgeries.

The data were collected by the research team supervised by the PI of the research.

After the approval of the UQU institutional research board, the data were collected in a separate identifying log sheet that was kept in a secure, locked place. The data entry was done by the research team and immediately transferred to a statistical database after verification.

**Sample size determination:**

The sample size was determined using a formula for cross-sectional studies, considering a confidence level of 95%. A minimum sample size of 385 participants was targeted. A convenient sampling technique was used to select participants.

**Data Analysis**

All data were entered and analyzed using IBM SPSS Statistics for Windows, Version 28.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize the bio-demographic characteristics of the participants, as well as their knowledge, awareness and experience related to appendicitis. Frequencies and percentages were used to describe categorical variables such as gender, age groups, marital status, educational level and responses to knowledge and experience items. An overall knowledge score was calculated for each participant by assigning one point for each correct response to the knowledge-related questions. Participants who scored equal to or greater than 60% of the total possible points were categorized as having good knowledge, while those scoring less than 60% were considered to have poor knowledge. To examine the associations between participants' knowledge levels and various demographic and clinical factors, Chi-square tests (Pearson's Chi-square or Exact Probability test, as appropriate) were used. The significance level was set at $p<0.05$.

**Ethical Part and Confidentiality**

This study was submitted to Umm Al-Qura University Institutional Research Board (IRB) for approval. No study activities were started until approval was obtained. Survey responses were collected in an anonymous fashion. We did not collect any identifying information from participants, no private information and all responses were confidentiality maintained. Approval No. (HAPO-02-K-012-2025-04-2663).

## RESULT

Table 1 presents the bio-demographic characteristics of the study population in Makkah. The majority of respondents (61.9%) were between 19 and 30 years of age, followed by smaller proportions in the age groups 31-40 (15.4%), 41-50 (12.6%), 51-60 (7.3%) and those over 60 years (2.8%). Females constituted the vast majority (82.5%) of the sample, while males comprised only 17.5%. Regarding marital status, over half of the participants were single (55.2%), while 38.8% were married and 5.9% were either divorced or widowed. Educational level was relatively high, with 57.0% holding a bachelor's degree and 29.7% having completed secondary education; only 3.5% had an education below secondary level. The presence of chronic diseases was reported by 16.4% of the respondents. About 30.1% reported a family history of appendicitis and 34.3% reported having been diagnosed with digestive disorders. A notable proportion (39.9%) had been admitted to the hospital due to abdominal pain, while 29.7% had undergone surgery for reasons other than appendicitis. Among those who had In previous surgeries, the most common procedure was appendicectomy (27.1%), followed by cesarean section (20.0%) and cholecystectomy (9.4%), with other procedures such as joint replacements, nasal surgeries and endoscopies reported less frequently.

Table 2 highlights the participants' knowledge and awareness regarding appendicitis. A significant majority (n = 256, 89.5%) reported having heard of appendicitis. When asked whether the general public has sufficient information about the condition, 43 participants (15.0%) agreed, 86 (30.1%) disagreed and over half (n = 157, 54.9%) were unsure. As for self-assessed understanding of appendicitis symptoms, 173 (60.5%) felt fairly confident, while 57 (19.9%) were not confident and 56 (19.6%) felt very confident. When asked directly, 167 participants (58.4%) claimed to know the symptoms of acute appendicitis, whereas 119 (41.6%) did not. Regarding specific symptoms, abdominal pain was most commonly identified (n = 268, 93.7%), followed by nausea (n = 188, 65.7%), vomiting (n = 178, 62.2%) and fever (n = 145, 50.7%). Less common symptoms included dizziness (23.8%), headache (16.1%), cough (7.3%) and sore throat (3.8%), with only 0.7% selecting "others." Knowledge of surgical methods varied: 60 participants (21.0%) were aware only of open surgery, 63 (22.0%) knew only laparoscopic surgery and 163 (57.0%) were aware of both. Regarding differences between the two methods, 148 (51.7%) correctly noted that laparoscopic surgery is less invasive, while 43 (15.0%) mentioned it has fewer complications; fewer participants chose open surgery involves one incision (n = 12, 4.2%) or believed both methods are similar (n = 12, 4.2%), while 71 (24.8%) admitted they did not know. For treatment, the vast majority (n = 248, 86.7%) correctly identified surgery (appendectomy) as the standard approach, while others believed in painkillers and bed rest (n = 18, 6.3%), antibiotics only (n = 15, 5.2%) or were unsure (n = 5, 1.7%). Concerning potential complications post-appendectomy, wound infection was the most recognized (n = 179, 62.6%), followed by abscess (n = 87, 30.4%) and fever (n = 75, 26.2%). Additionally, 69 participants (24.1%) acknowledged all listed complications, while fewer noted vomiting (n = 48, 16.8%) and diarrhea (n = 47, 16.4%). Only 6 respondents (2.1%) were unaware of any possible complications.

Table 1: Bio-Demographic Characteristics of the Study Population iIn Makkah, Saudi Arabia (N = 286)

| Bio-demographics | | No | Percentage |
|---|---|---|---|
| Age in years | 19-30 | 177 | 61.90% |
| | 31-40 | 44 | 15.40% |
| | 41-50 | 36 | 12.60% |
| | 51-60 | 21 | 7.30% |
| | >60 | 8 | 2.80% |
| Gender | Male | 50 | 17.50% |
| | Female | 236 | 82.50% |
| Marital status | Single | 158 | 55.20% |
| | Married | 111 | 38.80% |
| | Divorced/widow | 17 | 5.90% |
| Highest educational level | Below secondary | 10 | 3.50% |
| | Secondary education | 85 | 29.70% |
| | Diplome | 15 | 5.20% |
| | Bachelor degree | 163 | 57.00% |
| | Post-graduate degree | 13 | 4.50% |
| Have chronic diseases | Yes | 47 | 16.40% |
| | No | 239 | 83.60% |
| Do any of your immediate family members have a history of ppendicitis? | Yes | 86 | 30.10% |
| | No | 175 | 61.20% |
| | May be | 25 | 8.70% |
| Have you ever been diagnosed with any digestive disorders? | Yes | 98 | 34.30% |
| | No | 188 | 65.70% |
| Were you admitted to the hospital due to abdominal pain? | Yes | 114 | 39.90% |
| | No | 172 | 60.10% |
| Have you had surgery for other reasons before? | Yes | 85 | 29.70% |
| | No | 201 | 70.30% |
| Type of surgery | Appendicectomy | 23 | 27.10% |
| | CS | 17 | 20.00% |
| | Not reported | 13 | 15.30% |
| | Cholecystectomy | 8 | 9.40% |
| | Joint replacement | 3 | 3.50% |
| | Nasal surgery | 3 | 3.50% |
| | Others | 3 | 3.50% |
| | Endoscopy | 2 | 2.40% |
| | Hernia | 2 | 2.40% |
| | Joint surgery | 2 | 2.40% |
| | Gastrectomy | 1 | 1.20% |
| | Lymphadenectomy | 1 | 1.20% |
| | others | 1 | 1.20% |
| | Piles | 1 | 1.20% |
| | Renal donation | 1 | 1.20% |
| | Thyroid removal | 1 | 1.20% |
| | Tonsillectomy | 1 | 1.20% |
| | Tonsillectomy and Adenoidectomy | 1 | 1.20% |
| | Tumor removal | 1 | 1.20% |

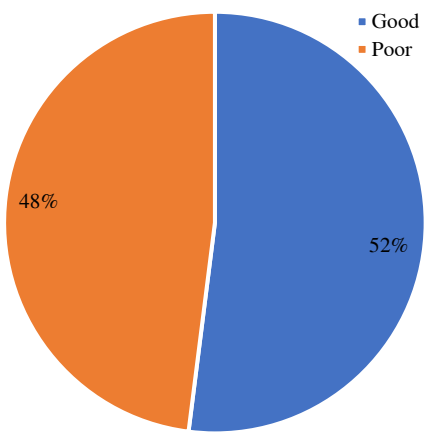


Figure 1: Knowledge and awareness levels

Figure 1 shows the overall knowledge and awareness levels of appendicitis among the study population. Out of 286 participants, 148 individuals (51.7%) had a good level of knowledge, while 138 (48.3%) exhibited poor knowledge.

Table 3 clarifies the participants' personal history with appendicitis, treatment experiences and recovery outcomes. Out of the total 286 participants, only 38 (13.3%) reported having had appendicitis, while the majority (n = 248, 86.7%) had not. Among those diagnosed, nearly all (n = 36, 94.7%) underwent surgical removal of the appendix (appendectomy). When asked about the type of surgery, 23 (63.9%) underwent open surgery, while 12 (33.3%) had laparoscopic surgery; one participant (2.8%) was unsure of the surgical method. Most patients (n = 34, 89.5%) initially sought medical attention by going directly to the emergency room, while a small number (n = 4, 10.5%) went to private

Table 2: Knowledge and Awareness of Appendicitis Among the Study Population in Makkah, Saudi Arabia (N = 286)

| Knowledge items | No | % |
|---|---|---|
| **Have you ever heard of appendicitis?** | | |
| Yes | 256 | 89.50% |
| No | 30 | 10.50% |
| **Do you think the general public has enough information about appendicitis?** | | |
| Yes | 43 | 15.00% |
| No | 86 | 30.10% |
| May be | 157 | 54.90% |
| **How confident are you in your understanding of the symptoms of appendicitis?** | | |
| Not confident at all | 57 | 19.90% |
| Fairly confident | 173 | 60.50% |
| Very confident | 56 | 19.60% |
| **Do you know the symptoms of acute appendicitis?** | | |
| Yes | 167 | 58.40% |
| No | 119 | 41.60% |
| **The symptoms of acute appendicitis** | | |
| Abdominal pain | 268 | 93.70% |
| Nausea | 188 | 65.70% |
| Vomiting | 178 | 62.20% |
| Fever | 145 | 50.70% |
| Dizziness | 68 | 23.80% |
| Headache | 46 | 16.10% |
| Cough | 21 | 7.30% |
| Sore throat | 11 | 3.80% |
| Others | 2 | 0.70% |
| **Do you know the surgical methods for appendicitis removal?** | | |
| Yes, I only know open surgery | 60 | 21.00% |
| Yes, I only know laparoscopic surgery. | 63 | 22.00% |
| Yes, I know both types | 163 | 57.00% |
| **What is the difference between open and laparoscopic appendectomy?** | | |
| Laparoscopic surgery has fewer complications than open surgery. | 43 | 15.00% |
| Laparoscopic surgery is less invasive and uses small incisions. | 148 | 51.70% |
| Open surgery involves only one incision. | 12 | 4.20% |
| Both surgeries are similar | 12 | 4.20% |
| I don't know | 71 | 24.80% |
| **What is the treatment for appendicitis?** | | |
| Appendectomy (surgery) | 248 | 86.70% |
| Pain killers and bed rest | 18 | 6.30% |
| Antibiotics only | 15 | 5.20% |
| I don't know | 5 | 1.70% |
| **Complications can occur after an appendectomy** | | |
| Wound infection | 179 | 62.60% |
| Abscess | 87 | 30.40% |
| Fever | 75 | 26.20% |
| All of these | 69 | 24.10% |
| Vomiting | 48 | 16.80% |
| Diarrhea | 47 | 16.40% |
| I don't know | 6 | 2.10% |

clinics. The primary reason for seeking medical help was severe pain, cited by 134 respondents (83.8%), followed by vomiting (n = 44, 27.5%) and anorexia (n = 41, 25.6%). Among those who had an appendectomy, 19 participants (52.8%) reported experiencing postoperative complications, with abdominal pain (n = 11, 61.1%) being the most common, followed by nausea (n = 7, 38.9%), fever (n = 4, 22.2%), vomiting (n = 3, 16.7%) and headache (n = 3, 16.7%). In terms of pain severity, most patients rated their pain between 4-6 on a 10-point scale (n = 15, 41.7%), while

Table 3: History, Management and Postoperative Experience of Appendicitis Among the Study Population in Makkah, Saudi Arabia (N = 286)

| Items | No | % |
|---|---|---|
| **Have you ever had appendicitis?** | | |
| Yes | 38 | 13.30% |
| No | 248 | 86.70% |
| **If you have had appendicitis, have you had surgery (appendectomy)?** | | |
| Yes | 36 | 94.70% |
| No | 2 | 5.30% |
| **If you had an appendectomy, what type of surgery did you have?** | | |
| Appendectomy open surgery | 23 | 63.90% |
| Laparoscopic appendectomy | 12 | 33.30% |
| Not sure | 1 | 2.80% |
| **How did you first seek medical help for appendicitis?** | | |
| I went to the emergency room | 34 | 89.50% |
| I went to a private clinic | 4 | 10.50% |
| Why did you seek medical help? | | |
| Sever pain | 134 | 83.80% |
| Anorexia | 41 | 25.60% |
| Vomiting | 44 | 27.50% |
| **Experienced any complications after your appendix removal surgery** | | |
| Yes | 19 | 52.80% |
| No | 17 | 47.20% |
| **If yes, type of complications** | | |
| Abdominal pain | 11 | 61.10% |
| Fever | 4 | 22.20% |
| Nausea | 7 | 38.90% |
| Vomiting | 3 | 16.70% |
| Headache | 3 | 16.70% |
| **Pain severity (0-10 scale)** | | |
| 0 | 1 | 2.80% |
| 3-Jan | 13 | 36.10% |
| 6-Apr | 15 | 41.70% |
| 10-Jul | 7 | 19.40% |
| **How many days did you spend in recovery after surgery?** | | |
| 1-2 days | 19 | 52.80% |
| 3-4 days | 13 | 36.10% |
| More than 5 days | 4 | 11.10% |
| **How long did it take you to return to normal daily activities after surgery?** | | |
| < 1 week | 8 | 22.20% |
| 1-2 weeks | 18 | 50.00% |
| 2-4 weeks | 10 | 27.80% |

13 (36.1%) rated it between 1-3 and 7 (19.4%) rated it as severe (7-10). Only one participant (2.8%) reported no pain. Regarding recovery, 19 (52.8%) recovered within 1-2 days, while 13 (36.1%) required 3-4 days and 4 (11.1%) needed more than 5 days. When asked about the time taken to resume normal daily activities, half (n = 18, 50.0%) returned within 1-2 weeks, 10 (27.8%) took 2-4 weeks and 8 (22.2%) recovered in less than a week.

Table 4 presents the relationship between various demographic and clinical factors and participants' overall knowledge level of appendicitis. Among the significant associations, gender showed a notable difference (p = 0.014), with 64.0% of males having poor knowledge compared to 44.9% of females, indicating that females were significantly more likely to have a good understanding of appendicitis (55.1% vs. 36.0%). Marital status was also significantly associated with knowledge levels (p = 0.001). Among single participants, 61.4% had good knowledge, compared to only 38.7% of married individuals

Table 4: Factors Associated with The Overall Knowledge Level of Appendicitis Among the Study Population in Makkah, Saudi Arabia (N = 286)

| | Overall knowledge level | | | | |
|---|---|---|---|---|---|
| | Poor | | Good | | |
| Factors | No | Percentage | No | Percentage | p-value |
| **Age in years** | | | | | |
| 19-30 | 75 | 42.40% | 102 | 57.60% | 0.100^ |
| 31-40 | 26 | 59.10% | 18 | 40.90% | |
| 41-50 | 19 | 52.80% | 17 | 47.20% | |
| 51-60 | 12 | 57.10% | 9 | 42.90% | |
| >60 | 6 | 75.00% | 2 | 25.00% | |
| **Gender** | | | | | |
| Male | 32 | 64.00% | 18 | 36.00% | 0.014* |
| Female | 106 | 44.90% | 130 | 55.10% | |
| **Marital status** | | | | | |
| Single | 61 | 38.60% | 97 | 61.40% | 0.001* |
| Married | 68 | 61.30% | 43 | 38.70% | |
| Divorced/widow | 9 | 52.90% | 8 | 47.10% | |
| **Highest educational level** | | | | | |
| Below secondary | 5 | 50.00% | 5 | 50.00% | 0.990^ |
| Secondary education | 42 | 49.40% | 43 | 50.60% | |
| Diploma | 8 | 53.30% | 7 | 46.70% | |
| Bachelor degree | 77 | 47.20% | 86 | 52.80% | |
| Post-graduate degree | 6 | 46.20% | 7 | 53.80% | |
| **Have chronic diseases** | | | | | |
| Yes | 23 | 48.90% | 24 | 51.10% | 0.918 |
| No | 115 | 48.10% | 124 | 51.90% | |
| **Have you ever been diagnosed with any digestive disorders?** | | | | | |
| Yes | 46 | 46.90% | 52 | 53.10% | 0.748 |
| No | 92 | 48.90% | 96 | 51.10% | |
| **Were you admitted to the hospital due to abdominal pain?** | | | | | |
| Yes | 54 | 47.40% | 60 | 52.60% | 0.808 |
| No | 84 | 48.80% | 88 | 51.20% | |
| **Have you had surgery for other reasons before?** | | | | | |
| Yes | 39 | 45.90% | 46 | 54.10% | 0.602 |
| No | 99 | 49.30% | 102 | 50.70% | |
| **Have you ever had appendicitis?** | | | | | |
| Yes | 21 | 55.30% | 17 | 44.70% | 0.353 |
| No | 117 | 47.20% | 131 | 52.80% | |
| **If you have had appendicitis, have you had surgery (appendectomy)?** | | | | | |
| Yes | 19 | 52.80% | 17 | 47.20% | 0.049*^ |
| No | 2 | 100.00% | 0 | 0.00% | |

Table 5: The Relation Between Source of Medical Help (ER vs. Clinic) and Postoperative Experience of Appendicitis

| How did you first seek medical help for appendicitis? | | | | | |
|---|---|---|---|---|---|
| | I went to the emergency room | | I went to a private clinic | | |
| Items | No | Percentage | No | Percentage | p-value |
| **Experienced any complications after your appendix removal surgery** | | | | | |
| Yes | 19 | 59.40% | 0 | 0.00% | 0.025* |
| No | 13 | 40.60% | 4 | 100.00% | |
| **Pain severity (0-10 scale)** | | | | | |
| 0 | 1 | 3.10% | 0 | 0.00% | 0.935 |
| 3-Jan | 12 | 37.50% | 1 | 25.00% | |
| 6-Apr | 13 | 40.60% | 2 | 50.00% | |
| 10-Jul | 6 | 18.80% | 1 | 25.00% | |
| **How many days did you spend in recovery after surgery?** | | | | | |
| 1-2 days | 17 | 53.10% | 2 | 50.00% | 0.688 |
| 3-4 days | 11 | 34.40% | 2 | 50.00% | |
| More than 5 days | 4 | 12.50% | 0 | 0.00% | |
| **How long did it take you to return to normal daily activities after surgery?** | | | | | |
| < 1 week | 7 | 21.90% | 1 | 25.00% | 0.986 |
| 1-2 weeks | 16 | 50.00% | 2 | 50.00% | |
| 2-4 weeks | 9 | 28.10% | 1 | 25.00% | |

P: Exact probability test, *p<0.05 (significant)

and 47.1% of those divorced or widowed. Lastly, a significant association was found regarding whether individuals who had appendicitis underwent surgery (p = 0.049^). Among those who had an appendectomy, 47.2% demonstrated good knowledge, while 100% of those who did not undergo surgery had poor knowledge.

Table 5 explores the relationship between the initial source of medical help for appendicitis (emergency room

vs. private clinic) and the patients' postoperative experiences. A statistically significant association was found between the source of care and the occurrence of postoperative complications ($p = 0.025$). Among those who sought help at the emergency room, 59.4% experienced complications, while none of the patients who visited a private clinic reported any complications. Other postoperative outcomes, including pain severity ($p = 0.935$), recovery duration ($p = 0.688$) and time to return to normal daily activities ($p = 0.986$), showed no statistically significant differences between the two groups.

## DISCUSSION

This study aimed to assess the knowledge, awareness and experiences related to appendicitis among residents in Makkah, Saudi Arabia. The demographic characteristics of the participants provide important context for interpreting the findings. The majority of respondents were young adults aged 19 to 30 years and the sample was predominantly female. Most participants were single and had attained a relatively high level of education, with more than half holding a bachelor's degree. A prominent portion of the participants reported relevant medical backgrounds: approximately one-third had a family history of appendicitis and over a third had been diagnosed with digestive disorders. Furthermore, nearly 40% had been hospitalized due to abdominal pain and about 30% had undergone surgeries unrelated to appendicitis. Among these, appendicectomy was the most common surgical procedure, followed by cesarean section and cholecystectomy. The prevalence of prior abdominal health issues and surgical history indicates that many respondents had personal or family experiences that could influence their awareness and perceptions of appendicitis, potentially impacting their knowledge levels assessed in the study.

Also, our study revealed average levels of knowledge and awareness regarding appendectomy and its complications among the population of Makkah. A high proportion of participants had heard of appendicitis, which matches with studies conducted in other regions, such as Saudi Arabia and globally, where awareness of appendicitis is generally high due to its common occurrence and frequent media portrayal [1,2]. However, only 58.4% claimed to know the symptoms of acute appendicitis, suggesting a gap in detailed understanding despite general awareness. This is consistent with a study in Riyadh, where despite high awareness, only about half of the participants could accurately identify key symptoms [3]. Abdominal pain was the most recognized symptom, followed by nausea and vomiting, which is comparable to findings in international studies, where abdominal pain is the most commonly reported symptom due to its prominence in clinical presentations [3]. However, less typical symptoms such as dizziness (23.8%) and headache (16.1%) were poorly recognized, mirroring findings in studies from the United States and Europe, where non-classical symptoms are often overlooked by the general public [4-6]. Regarding surgical methods, more than half of the participants were aware of both open and laparoscopic appendectomy, which is higher than reported in a study from Jeddah, where only 40% knew about laparoscopic options [7]. However, misconceptions persisted, with only 51.7% correctly identifying laparoscopic surgery as less invasive. Globally, studies in the UK and Australia have shown similar knowledge gaps, where patients often lack a detailed understanding of surgical differences despite increased laparoscopic use [8,9].

A significant majority (86.7%) correctly identified surgery as the standard treatment, which is consistent with findings from studies in India [10] and Egypt [11], where surgical intervention is widely recognized as the definitive treatment for appendicitis. However, a small proportion believed in alternatives such as antibiotics or painkillers reflecting misconceptions seen in other populations where non-surgical management is sometimes perceived as sufficient. Knowledge of post-appendectomy complications was moderate, with wound infection being the most recognized, similar to findings in studies from Pakistan [12] and Nigeria [13]. However, awareness of other complications, such as intra-abdominal abscess and fever was lower.

Overall, nearly half of participants had good knowledge, which is slightly higher than findings from a similar study in Damascus among medical students. The average awareness score for the students was 20.6 with this data deviating 3.8, the smallest value for the awareness score was 5 and the largest value was 29 [14,15]. A higher awareness level was assessed by AlSaleh *et al.* [16]. where the awareness level of acute appendicitis was high (72.2%). History of appendectomy was almost 30% and was significantly more common in males than females. On the other hand, an average knowledge score among the study population was 4.1±1.81 out of 11 that was detected by Alsulaimani *et al.* [17]. Only 23.5% of participants had good knowledge about appendicitis.

Regarding factors associated with participants' overall knowledge of appendicitis, the study revealed several significant relationships [18-20]. Gender was a key determinant, with females demonstrating significantly higher knowledge levels compared to males. Marital status also influenced knowledge, as single participants were more likely to have good knowledge than those who were married or divorced/widowed. In addition, a significant association was observed between having undergone an appendectomy and knowledge level; participants who had surgery for appendicitis were more likely to be knowledgeable, while all those who had not undergone surgery showed poor knowledge [21-25].

## CONCLUSIONS AND RECOMMENDATIONS

In conclusion, our study revealed that just over half of the participants had good knowledge of appendicitis, a substantial proportion still had poor understanding, particularly among males and married individuals. Personal experience with appendicitis and undergoing surgery were associated with better knowledge, underlining the impact of

direct exposure on awareness levels. Most participants recognized common symptoms such as abdominal pain and nausea and correctly identified surgery as the main treatment method. However, uncertainty remained about surgical techniques and potential complications. Those who sought care through emergency services were more likely to experience postoperative complications compared to those who visited private clinics. There is a clear need for targeted health education programs, especially among males and married individuals, to improve public understanding of appendicitis. Educational campaigns should focus on symptom recognition, treatment options and when to seek urgent care.

## Acknowledgement

We thank the participants who contributed samples to the study.

## Conflicts of Interest

The authors declare that there are no conflicts of interest.

## Ethical Approval

Informed consent was obtained from each participant after explaining the study in full and clarifying that participation was voluntary. Data collected was securely saved and used for research purposes only.

## REFERENCES

[1] Addiss, D.G. *et al.* "The Epidemiology of Appendicitis and Appendectomy in the United States." *American Journal of Epidemiology*, vol. 132, no. 5, November 1990, pp. 910-925.

[2] Bom, W.J. *et al.* "Diagnosis of Uncomplicated and Complicated Appendicitis in Adults." *Scandinavian Journal of Surgery*, vol. 110, no. 2, June 2021, pp. 170-179.

[3] Krzyzak, M. and S.M. Mulrooney. "Acute Appendicitis Review: Background, Epidemiology, Diagnosis and Treatment." *Cureus*, vol. 12, no. 6, June 2020.

[4] Körner, H. *et al.* "Incidence of Acute Nonperforated and Perforated Appendicitis: Age-Specific and Sex-Specific Analysis." *World Journal of Surgery*, vol. 21, no. 3, 1997, pp. 313-317.

[5] Harriott, Camila Bras and Emmanuel E. Sadava. "Management of Complications after Appendectomy: Literature Review." *Current Problems in Surgery*, vol. 61, no. 7, 2024.

[6] Wu, T. *et al.* "Complications after Appendectomy in Patients with Treated Appendicitis: Results from a Retrospective Study." *Annals of Palliative Medicine*, vol. 10, no. 12, 2021, pp. 12546-12553.

[7] Bhangu, A., *et al.* "Emergency Surgery. Acute Appendicitis: Modern Understanding of Pathogenesis, Diagnosis and Management." *The Lancet*, vol. 386, no. 5, September 2015, pp. 1278-1287.

[8] Rebollar González, R.C. *et al.* "Apendicitis Aguda: Revisión de la Literatura." *Revista del Hospital Juárez de México*, vol. 76, no. 4, 2009, pp. 210-216.

[9] Piccinni, G. *et al.* "The 'BASE-FIRST' Technique in Laparoscopic Appendectomy." *Journal of Minimal Access Surgery*, vol. 8, no. 1, 2012, pp. 6-8.

[10] Fitzmaurice, G.J. *et al.* "Antibiotics versus Appendectomy in the Management of Acute Appendicitis: A Review of the Current Evidence." *Canadian Journal of Surgery*, vol. 54, no. 5, 2011, pp. 307-314.

[11] Miftah, M. *et al.* "Open versus Laparoscopic Appendectomy among Saudi Patients." *International Journal of Community Medicine and Public Health*, vol. 5, no. 9, 2018, pp. 3725-3729.

[12] Tucker, O. *et al.* "Laparoscopic Appendicectomy: Review of 331 Cases over 7 Years, in a Saudi Arabian Hospital." *Endoscopy*, vol. 34, no. 8, 2002, pp. 639-642.

[13] Alfehaid, M.S. *et al.* "Elevated Total and Direct Bilirubin Are Associated with Acute Complicated Appendicitis." *BMC Surgery*, vol. 23, 2023, 342.

[14] Azodi, O. Sadr *et al.* "Impact of Body Mass Index and Tobacco Smoking on Outcome after Open Appendectomy." *British Journal of Surgery*, vol. 95, no. 6, 2008, pp. 751-757.

[15] Alkhalifah, H.A. *et al.* "Surgical and Pre-surgical Factors Affecting Appendectomy Outcomes in Jeddah, Saudi Arabia: A Retrospective Record Review." *Cureus*, vol. 16, no. 6, 2024.

[16] AlSaleh, R. *et al.* "Awareness of Appendectomy and Its Complications among Saudis." *Cureus*, vol. 15, no. 10, October 2023.

[17] Alsulaimani, N. *et al.* "Parental Knowledge of Appendicitis and Its Management Options among Children of Makkah Region, Saudi Arabia." *Cureus*, vol. 15, no. 10, October 2023.

[18] Ohmann, C. *et al.* "Diagnostic Scores for Acute Appendicitis. Abdominal Pain Study Group." *The European Journal of Surgery = Acta Chirurgica*, vol. 161, no. 4, April 1995, pp. 273-281.

[19] Laos, E.G. *et al.* "Challenges in Management of Acute Appendicitis: A Narrative Review." *Current Problems in Surgery*, August 2024.

[20] Andersson, R.E. "The Natural History and Traditional Management of Appendicitis Revisited: Spontaneous Resolution and Predominance of Prehospital Perforations Imply That a Correct Diagnosis Is More Important than an Early Diagnosis." *World Journal of Surgery*, vol. 31, 2007, pp. 86-92.

[21] Gignoux, B. *et al.* "Should Ambulatory Appendectomy Become the Standard Treatment for Acute Appendicitis?" *World Journal of Emergency Surgery*, vol. 13, 2018, pp. 1-8.

[22] Cash, C.L. *et al.* "A Prospective Treatment Protocol for Outpatient Laparoscopic Appendectomy for Acute Appendicitis." *Journal of the American College of Surgeons*, vol. 215, no. 1, July 2012, pp. 101-105.

[23] El-Nemr, S.A. *et al.* "Laparoscopic versus Open Appendectomy in the Management of Complicated Appendicitis." *Al-Azhar International Medical Journal*, vol. 5, no. 5, 2024, p. 5.

[24] Bilal, A. *et al.* "Postoperative Complications of Anaesthesia following Appendectomy: Complications of Anaesthesia following Appendectomy." *The Healer Journal of Physiotherapy and Rehabilitation Sciences*, vol. 4, no. 5, September 2024, pp. 15-21.

[25] Balogun, O.S. *et al.* "Acute Perforated Appendicitis in Adults: Management and Complications in Lagos, Nigeria." *Annals of African Medicine*, vol. 18, no. 1, 2019, pp. 36-41.